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THE NATIONAL ASSOCIATION OF NURSE ANESTHETISTS

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The Bulletin of the National Association of Nurse Anesthetists

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THE CONTENTS

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WHAT THE HOSPITAL ANESTHETIST SHOULD BE AND SHOULD NOT BE*

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Medical Director, Jewish Hospital, Philadelphia, Pa.

We say that a friend is a person who knows all about you and still likes you. So far as the anesthetists are concerned, while I do not know all about them, I have had some opportunity to observe the workings of that highly-trained professional person who is the nurse anesthetist.

I desire, first of all, to place the nurse anesthetist as a member of that group of persons who are responsible for the treatment of the sick. She should be a professional person, with all the implications that go with a professionalist. A profession is one whose members claim to have attained a special skill in the exemplification or practice of the art or science of their particular calling. You profess to be skilled in anesthesia. You profess to have an unusual ability to safeguard human life during the administration of a dangerous drug. You have no right to be a member of your profession unless this professing is justified by the facts.

The exemplification of any profession has two particular headings: The practice of the art and the practice of the science of that profession. There is many a physician who is highly skilled in the practice of the science of his profession who is far lacking in the ability to exemplify its art. There is many a physician who otherwise should be eminently successful because of his diagnostic and therapeutic skill, who is unable to handle people, who does not know the psychology of human beings in distress, who is not able to differentiate between the psychological treatment to be given to one as compared with that to be given to another.

I think I may apply this also to the anesthetists. There are anesthetists who are highly skilled in the handling of their particular agent but who are woefully lacking in the ability to exemplify its art. The art of anesthesia cannot be described fully in the text book.

Art can be compared with tact, if you please. There is no bottle in the drug store from which one may withdraw routine and sufficient doses of tact in order to make one always choose the right time to say the right thing. Tact is an intangible thing with which we are born and there is no way to evaluate it. The art of anesthesia administration, it seems to me, has something of the same nature. There are those who are soft-handed and soft-voiced, whose very presence seems to assist the anesthetic to be given. There are those who are strident-voiced and whose presence, perhaps unknowingly, seems to produce a strictly stimulating effect rather than a soporific effect.

The proper practice of the art of anesthesia, it strikes me, is a decidedly important attainment by the nurse anesthetist. All of those persons who contact the sick need just this intangible thing which patients appreciate

* Read at the fifth annual meeting of the National Association of Nurse Anesthetists, held in Atlantic City, N. J., September 13-17, 1937.

perhaps most, not knowing of the skill required to handle any particular drug. The nurse anesthetist who works in a hospital or who works in a clinic is a professional person, dignified, quiet in her demeanor and dress, and courteous. She must be able to exemplify the art of handling sick people and must have as her background a training which justifies her in professing to be a member of such a profession.

From the standpoint of organization in the hospital, the nurse anesthetist is in a large measure a department head, although many a State Board insists that a physician must be at the head of the department. She is the sort of person who mingles with other department heads and commands their respect as a person unusually skilled. She must be able to justify and to maintain such a respect.

In the organization of the hospital set-up, there are various ways of placing the anesthesia department. In some instances she answers directly to the superintendent of the hospital. In some instances, she answers to the medical director or to the assistant superintendent. In some instances, she answers to the chief of the surgical staff.

It would strike me that the peace and quiet and comfort of the anesthetist is disturbed often by an incorrect organization set-up. I have times without number stressed this point, that when an anesthetist goes to a hospital to undertake a new position, first of all she should learn how that hospital functions. It would be a perfectly logical question to ask, "Is there a blueprint of the organization in the hospital? Where do I fit into this machine? To whom do I answer? How may I get my supplies? Who is the person who will support me in insisting on carrying out the rules of this department?" If there is any haziness about these matters, if the set-up is one which is founded on a "You like me and I will like you" sort of arrangement, or a plan founded on a "We are all ladies and gentlemen and it is just a question of our getting along together" idea, I say the nurse anesthetist should be somewhat wary of entering such an organization.

Each hospital should have displayed prominently a blueprint of its organization set-up. To whom does the nurse anesthetist answer? Through what channels does she go? Personally, my feeling would be that the anesthetist should not answer to the superintendent of nurses, not to the supervising nurse in the operating room, not to the chief surgeon, but if there be a medical officer in charge, straight to him. If the superintendent of the hospital is not medically trained, he usually has a medical officer as his assistant, and then to him. Unless we do this, misunderstandings are sure to arise.

I have never seen a hit-or-miss hospital set-up, a set-up that was founded on personalities and not principles, that did not eventually give rise to heartburnings and unrest. No matter how much I may like you or you may like me, when we enter into a professional, an organization relationship, and I take some of your duties or you take some of mine, we may be fine personal friends but we are sure to experience friction. The set-up of the anesthesia department is important and I urge that you consider the necessity of properly fitting into this great machine that we call the hospital.

This is a curious age in which we live. It is said to be a time in which things change so rapidly that most of us have a hard time to keep up. We are said to be living in changing times and changing conditions, and that par-

ticular expression is used to justify almost any kind of questionable behavior. Things that we thought were just professional dealings, which we thought were fair and by which we have guided our lives, are now changing. We are even told that the time has come when nurse anesthetists and others, in order to protect themselves in hospital work, should form as a group and vote as a body.

The implications of the times are perfectly clear but after all, it strikes me that those of us who have secured the benefit which usually comes in the handling of sick people, will think twice before we depart from the old traditions, before we fail to cling to the things that we know are right and follow after the things which may be right but which have not yet been proven so. Hospitals for the past few years have been plagued grievously by an economic breakdown. We find these newer developments again plaguing the hospitals and perhaps, if anything, more difficult to handle. I urge every hospital group to remember that we are professional persons, that there is something about a profession which forbids our doing things that we can do as individuals, and that when we depart from the traditions of the past which have proven so trustworthy, we depart somewhat from the high ideals which all of us should possess.

The nurse anesthetist, of course, is the person who is loyal to her organization, who is loyal to her department heads who work with her, who realizes that all are human and who is willing to give and take, and when she rubs elbows with the nurse supervisor of the operating room sparks do not fly. I have seen some interesting combats between those two personalities that would really make the battle of the Marne seem almost like a game of marbles. Here again, I think this exemplifies the statement which I made a moment ago, that two perfectly estimable people whose duties are not differentiated by a rather clear line, are likely to enter into personalities without even knowing it. Therefore I urge the differentiation, the outlining of duties, the drawing of duty border lines.

I have been very much interested in the past few years in reading reports which tend to prove legally that the nurse anesthetist is indeed practicing medicine without a license. You have heard this subject discussed from many platforms. You know about the legal tests that have been made. You know that in certain instances, it has been proven that the Board of the hospital is not wholly responsible for the acts of its agents legally.

I saw the other day a report of a suit in a certain state in which a nurse, having been ordered to fill a syringe with procaine for a surgeon who wished to do a minor operation, chose the wrong bottle, failed to look at the label, and filled the syringe with formaldehyde. The injection was made. The patient was not grievously harmed, but a suit resulted in which, in the first trial, the hospital and the nurse were held guilty and the surgeon was excused. It was appealed and in that trial, the hospital and the nurse were again held guilty. It was again appealed and the nurse finally was the person who was fined $5,000 for her mistake, the hospital being held without blame because it had used due care in selecting the nurse. The surgeon was held to be without blame because, before witnesses, he had ordered the correct drug. The nurse was held to blame because she filled the syringe with the wrong drug.

The implications of this particular legal case are fairly plain, that a Board

of Trustees, having selected with due care a hospital officer, and that hospital officer making an error is held responsible. I do not know whether any such test has ever been made of the acts of the nurse anesthetist. Whether or not, from that particular case, one might infer that for the death of a patient on the operating table or for some other particular and grievous accident, she may be held legally to blame, I do not know, but our law in regard to hospital responsibility is being rapidly remade as indicated by the above test.

Of course, it has been proved time and time again that the nurse anesthetist, in administering a drug which may be lethal, is not practicing medicine. She is doing so under the orders and by the direction of the surgeon in charge. It is perfectly possible to infer, and I think the public generally would agree, that it is very much safer for a trained woman anesthetist to give an anesthetic than the average untrained physician.

You people have been rather on the spot for the past three or four years because you have been taking away, so it is said, from starving physicians what may be transferred into a valuable consultation service. Now that offices are filling and practice is picking up, I think probably the crisis of the situation has passed. I think we have gotten so far now that we are able to pay our rent up to the first of last January. Our car has been repaired and we were at the seashore a few days this summer and we feel better. But we were decidedly worried for fear that we would have to insist that you no longer give anesthetics. Seriously, the crisis with which you have been laboring and with which the physicians have been laboring too, is, I think, gradually disappearing.

It is an interesting thing to note a resolution that was passed in this very city last June, when the American Medical Association met here. You saw the resolution. It was to the effect that it was unfair and unethical and improper for nurses to administer anesthetics and the American Medical Association went on record as saying that only physicians should be allowed to do this. I believe, however, that until doctors are prepared to furnish skilled, professional anesthetists, until the doctors spend time and effort in learning this specialty, we had better not make any radical change.

I think a profession is made better by an attack. You are made to review yourself a trifle, you are made to see for yourself what sort of a standard you are walking under, whether or not you really justify the confidence we have given you. I think you have come out a great deal stronger than you were before the battle of the ether can started.

One thing more, and that is this: The question of liability for hospital employees is an important one. Many institutions feel that they should take out a liability insurance policy which covers all of their employees; the head of the physiotherapy department, the head of the X-ray department and the technicians; and compensation insurance for the orderlies and attendant staff. I think the hospital some day should work out a way in which you anesthetists are protected against liability suits. It is a crime to take a life's savings away from an otherwise fine nurse because she neglected in one instance to look at the bottle.

There are two things more and then I am through. An anesthetist is not a jack of all trades. To be sure, in the small hospital she has to do other things besides giving anesthetics. She

may be the librarian; she may work in the laboratory; she may do something else that has to be done. There may be a split-up of duties in order to have everything done but generally it is no more right to require the anesthetist to do such odd jobs than to require the medical director to do the laundry or mow the lawn. The lawn needs to be mown but it is an expensive mowing when you put a man such as that on the job. The anesthetist is not a person to constantly and without objection, accept discourtesies from those in the operating room. I am particularly thinking about that person who is a splendid surgeon but who has a temper as short and as sharp as a steel trap. The anesthetist is always present and when one is looking for somebody to relieve the tension, she usually is the safety valve and gets criticism which she does not deserve. Of course, as a basic administrative policy, we never criticize anyone in the presence of other people but the surgeon forgets that in the heat of the surgical operating room.

It is not too much to suppose that your profession has so proven itself that nobody can truthfully say that you are trying to lift yourselves by your own bootstraps. You are firmly established as one of those who have been given the privilege of treating and understanding sick people, who know, perhaps better than others, the psychology of a person who is facing a crisis in his life because of an operation. While we get used to operations, it is not our right lower quadrant that is being manhandled. In this respect, you have an opportunity to minister in a spiritual way to persons to a degree not granted to many of us.

ADVANTAGES OF PREANESTHETIC MEDICATION*

VIOLET CAMPBELL

St. Elizabeth's Hospital, Youngstown, Ohio

So many papers have been written on anesthesia that the choice of a subject has required a great deal of thought and has given us some anxiety. With the advance in anesthesia, and with the modern equipment placed at our disposal, we feel that a patient should have little fear of the operation. This is not the case, however, and it is of this apprehension we wish to speak.

The success of any anesthetic procedure is dependent largely upon adequate preanesthetic preparation. Such preparation involves consideration of a number of intricately related factors. Many requirements must be fulfilled before the patient is fully prepared to be anesthetized and operated upon. There should be a minimum of fear and a maximum of confidence of success. There should be depression of metabolism with dulling of reflex irritability without coincident depression of circulation or respiration and there should be no disturbance of the normal compensatory mechanisms. The patient should be fortified against any probable or possible unfavorable re-

* Read at the fourth annual meeting of the Ohio Association of Nurse Anesthetists, April 14 and 15, 1937, in Columbus, Ohio.

action characteristic of the anesthetic or operation. Efforts to produce this ideal state were made many centuries before the advent of anesthesia. Opiates, such as mandragora and cannabis indica were used freely to dispel the fears of the patient as well as to allay pain during the surgical procedure. The discovery of anesthesia and the assurance of a quiet sleep without pain should have obviated the necessity of any preanesthetic sedation, but it has proved no guarantee to the patient—fear still remains.

In 1869, Claude Bernard demonstrated in the animal laboratory the value of preanesthetic sedative preparation. He showed definitely that the opiates reduced the amount of oxygen consumed, decreased reflex irritability, and that by their use surgical narcosis was attained with much less of the anesthetizing agent. It was on the basis of those experiments that preanesthetic medication was established.

The essential purposes of premedication are: (1)—to lessen fear; (2)—to prevent unpleasant memories of the anesthesia which might influence the patient harmfully in any later surgery. Fear is definitely established as a factor in producing unfavorable reactions to anesthesia and surgical operations. It is a matter of record that patients who were in good health when posted for even minor surgical procedures have been known to die before the anesthetic was started or surgery attempted. These deaths have been attributed to sheer fright. Such fear is not engendered after the patient enters the hospital, but is there like a ghost from the time operation is mentioned. This apprehension is often increased by the kindly but misinformed neighbor who "knows all about it."

Individual variations are great, and the character of the outward manifestations almost as varied. The anesthetist's experience is the most valuable asset in determining the actual state of the patient's emotions. The patient who exhibits a great emotional drive, only to subside into quiet cooperation after a sedative has been administered and reassurance has been given, is more familiar, and less difficult, than the tight-lipped, taut person who shows little outward evidence of fear. Too much stress cannot be placed on the reassurance given by the attending staff as an aid to the drug therapy in the production of psychic sedation. The nursing personnel, by quiet manner and tactful conversation, may do much to dispel such ill-founded fears as may exist.

Twenty-four or forty-eight hours spent in the hospital prior to the operation gives the patient time to accommodate himself to his surroundings and to obtain a good night's rest. Many times it is advisable to give a soporific drug to insure sleep. In this hospital one of the barbiturates is very often used and if severe pain is present, an analgesic is supplemented.

In Guedel's discussion on pre-operative medication, he shows its effects on reflex irritability and metabolism. It is generally recognized that any change in normal metabolism is reflected in proportional degree in the reflex irritability present. The ideal condition of the patient for anesthesia is one in which the basal metabolism is as close as possible to the normal basal level of the individual. The reduction of metabolism requires knowledge of the drugs used in regard to potency, time of onset and duration of effects.

There are many conditions that influence metabolism:

(1) Age—the normal rate of metabolism varies with the age of the individual.

(2) Pain—there is no definite way of measuring pain but it is known that it markedly increases metabolism, and that metabolism is decreased by sedation.

(3) Emotional state—fear greatly increases metabolism and reflex irritability and it is thought that this is brought about by the increased secretion of adrenalin, thyroxin or similar substances. The injection of adrenalin has proved to have a definite but transient effect on metabolism, except in the nervous patient, where the effect is sustained.

(4) Toxemia is accompanied by a marked increase in metabolism, the degree of which depends largely upon the general condition of the patient, the presence or absence of debility, and the extent of the toxemia. In acutely toxic patients the metabolism may fall very rapidly and should be watched carefully. In long, debilitating diseases such as chronic osteomyelitis, the metabolism may be below normal. This can be recognized by the peculiar "washed out" appearance of the patient. The combination of pain, fever and acute toxemia so frequently found in acute appendicitis, acute osteomyelitis, et cetera, is felt to increase the metabolism over and above the sum of the increases due to the individual factors. While it is impossible to go into each condition, we believe the fact has been established that metabolism and reflex irritability are important factors in the premedication of the operative patient.

The value of decreased metabolism and obtundation of reflex irritability is generally acknowledged by the anesthetist. That a quiet, depressed patient is likely to have a quiet, smooth anesthesia is due to a large extent to preoperative medication as well as the utilization of the quick-acting anesthetic agents now in use. It is found that if metabolism is reduced to near the basal level the patient requires much less of the anesthetic agent to produce narcosis. In giving nitrous oxide or ethylene without this metabolic depression, it is often impossible to supply sufficient oxygen to prevent anoxemia and still maintain surgical anesthesia. Cyclopropane and ether being more potent, depression from premedication obviates the necessity of concentrating the anesthetic agent to the toxic level.

The preoperative use of drugs to offset the unfavorable effects of the anesthetic agent or operative procedure is of more recent usage, for example, the giving of ephedrine in avertin or spinal anesthesia, which we know prevents circulatory depression.

The opiates are found to be the most effectual drugs on the market for preanesthetic medication. They produce psychic sedation with a reduction in metabolism, without any serious impairment of circulation or respiration. They are alkaloids and may be divided into two principal groups—phenanthrene and iso-quinoline. We are most interested in the phenanthrene group, which includes morphine, codeine and heroin. Morphine, the most powerful of all the opiates, is representative of this group and the one of which we shall speak. The outstanding properties of this opiate are its hypnotic effect, its analgesic qualities and its depressant effect on metabolism. Morphine may be given intramuscularly, subcutaneously or intravenously. If given intramuscularly or subcutaneously it should be administered sixty to ninety minutes before the operation to get the maximum effect. If given intravenously the effect takes place in about one-third the time. The dosage

varies in accordance with the age and condition of the patient. Overdosage is manifested by depressed respiration and circulation, in which case oxygen with coramine or caffeine is usually effective. Occasionally we find individuals who have an idiosyncrasy for morphine, in which instance pantopon or dilaudid can be used with satisfactory results.

Atropine and scopolamine belong to the belladonna group and are widely used. These drugs by their parasympathetic action inhibit secretions. Scopolamine also produces psychic sedation by depressing the cerebral cortex. Atropine stimulates metabolism, while scopolamine, because it reduces emotional excitement, does not. It is convenient to give these drugs with morphine in doses of 1/100 to 1/300 grain. They are effective in fifteen to twenty minutes, and the effect lasts several hours. If mucus is already present it is inadvisable to administer either atropine or scopolamine because although the secretion of mucus is inhibited, the mucus already present becomes tenacious and more troublesome. Scopolamine is thought to deteriorate rapidly and toxic reactions most often follow its use if the supply is over one year old.

Barbituric acid derivatives are so widely known and used that I feel I need speak but little about them. They are hypnotics, varying in rapidity, duration and degree of action. The hypnosis is produced by depressing the central nervous system, particularly the higher cerebral centers. For preanesthetic medication these drugs are used to allay fear and not to decrease metabolism. They are given preferably by mouth but can be given rectally or intravenously. There are many other valuable drugs on the market that are being used successfully. Each patient is an individual problem and no written rule can be laid down that will apply to all.

GENERAL SURVEY CONCERNING THE USE OF PREOPERATIVE MEDICATION IN TONSIL AND ADENOID OPERATIONS IN THIRTY HOSPITALS IN THE UNITED STATES

H. D. HARLOWE, M.D.

From the Department of Otolaryngology, Western Reserve University School of Medicine, and the University Hospitals, Cleveland, Ohio

It is very interesting to review the literature on the subject of the use of preoperative medication in tonsil and adenoid operations, but it is more interesting to compare the various comments given pro and con in regard to such medication in this type of surgery.

I began two years ago to collect data and information on the subject, and sent questionnaires to all the larger hospitals in the United States. From the numerous replies received from many prominent men in this field, I believe that many minds are still frequently confronted with this problem. I am most grateful to all those who have contributed their time and effort to help make this survey possible.

A series of approximately two hundred and fifty tonsil and adenoid operations was performed using various known preoperative medications, and a similar series was performed in which no preoperative premedication was used. The members of the departments of otolaryngology and anesthesia, and the nursing staff were instructed to record their observations carefully in each case. The patients were divided according to race, then according to age groups—3 to 5 years, 5 to 7 years, 7 to 12 years, and 12 to 16 years. Approximately fifty patients were given one of the following preoperative premedications, except Group 1, which was used as a control series.

Group 1—Received no form of preoperative medication

Group 2—Received atropine only

Group 3—Received atropine and codeine

Group 4—Received atropine and nembutal

Group 5—Received atropine and morphine.

Because of the limited number of cases, and the various surgeons and anesthetists, our results showed quite a variation. It was found, for example, that five different surgeons using identical procedures varied as much as eight to twelve minutes in the time required to complete the operation. Many of the anesthetics were given by senior medical students and student nurse anesthetists under the careful supervision of a highly trained anesthetist. It was definitely observed that with the use of preoperative medication, the length of the induction was decreased from 2 to 3 minutes in many instances. A smoother anesthesia was usually maintained and a smaller amount of the anesthetic was required.

The surgeon was asked to give his reaction in regard to the anesthesia following the completion of each operation. The results show that when preoperative medication was used, an average of approximately one excellent anesthesia was obtained to each fair or satisfactory anesthesia when no preoperative medication was used. In regard to the various drug combinations used, it was difficult to name the most outstanding. Nembutal, or sodium pentobarbital, in small amounts, given in conjunction with atropine was found to work very nicely. The dosage of nembutal used ranged from a half grain to one and one half grains for patients from 6 to 16 years of age.

The nursing staff reported that as a general rule the patients receiving preoperative medication before tonsil and adenoid operations behaved better postoperatively than those who had received no premedication. As to increased thirst, they could see no great difference in the two groups. There were, however, two cases of slight atropine reaction observed in this series. No postoperative complications were observed in either of the two groups.

The following table (pages 14-15-16) covers the results of a survey taken from thirty representative hospitals in the United States.

COMMENTS

Of the 180,000 tonsil and adenoid operations reported, approximately 89,934 received some form of preoperative medication, and approximately 90,985 patients received no premedication.

The number of hospitals using preoperative medication routinely was 16, or approximately 50 per cent. Five hospitals, or approximately 20 per cent, used preoperative medication to some extent. Nine hospitals, or approximately 30 per cent, used no preoperative medication at all. From this data, one may say that at least two-thirds of the

TABLE

	Hospital & Location	Do you use any Preoperative medications with your T&A's?	Is Atropine used Preoperatively with your T&A operations?	Do your know of any bad results following the use of Preoperative medications for T&A's?	The kind and amount of premedication used preoperatively for T&A's	In which phase do you believe the use of Preoperative medication aids the most: 1. Anesthesia Phase; 2. Operative Phase; 3. Postoperative Phase?	The approximate number of T&A's operated	Personal Comments	Doctor's Name & Address
1	University Hospitals of Cleveland. Cleveland, Ohio.	No	No	No			10,000 or more	"Have seen a few cases of Atropine reaction following the use of atropine. I do not use any preoperative medication for T&A operations."	Wm. B. Chamberlin, M.D. Surgeon-in-charge N.E.T. Univ. Hospitals of Cleveland, Cleveland, Ohio.
2	Saint Alexis Hospital, Cleveland, Ohio.	No	No	No			5,000	"I do not use any preoperative medications for T&A's and believe the use of Atropine makes the children too thirsty following the operation for T&A."	Fred. W. Dixon, M.D. Chief-of-Staff, Saint Alexis Hospital, Cleveland, Ohio.
3	University Hospitals of Minnesota. Minneapolis, Minn.	Yes	Yes	No	Nembutal grs. 1/2 to 1-1/2 from ages 2 to 15 years. Atropine gr. 1/500 to 1/200 for ages 2 to 15 years.	1 2	500 yrly. 2,000	"Yes, we use Atropine to diminish secretions."	Horace Newhart, M.D. Professor of Otolaryngology and Director, Univ. of Minn., Minneapolis, Minn.
4	Mayo Clinic, Rochester, Minn.	Yes & No	Yes & No	No	If used, it is about 1/200 gr. of Atropine and about 1/6 to 1/8 gr. of Morphine.	1 2	(Not stated)	"First, preoperative medication is used by some members of the staff and not by others in T&A operations. If it is used, it is about 1/200 gr. of Atropine and about 1/8-1/6 gr. of morphine. Second, we feel that the use of Atropine certainly makes less mucus in the throat with general anesthesia and personally, I think it is a great advantage. The probabilities are it will always be a matter of personal opinion."	H. I. Lillie, M.D. Ear, Nose & Throat Section, Mayo Clinic, Rochester, Minn.
5	Wilmington General Hospital.								
6	Saint Francis Hospital. Wilmington, Delaware.	Yes & No	Yes & No	No		2	500 c 5,000 s		A. J. Strikol, M.D. Chief N.E.T. Dept., Wilmington General Hospital, Wilmington, Delaware.
7	Saint Luke's Hospital. Chicago, Illinois.	Yes	Yes	No			1,500 c 1,500 s	"We use Atroprine with general anesthesia using ether."	Wm. R. Darnell, M.D. Chief Resident N.E.T., Saint Luke's Hospital, Chicago, Illinois.
8	Riley Hospital. Indiana University Hospitals.				Atropine gr. 1/300 3-5 yrs. Atropine gr. 1/250 5-7 yrs.			"I use only Atropine in children where general anesthesia is used. Dosage varies from 1/300 to 1/150 gr. according to size and age. (Never use any Barbitals or Codeine.) Atropine cuts down the mucous secretion. Atropine sometimes gives the sensitive child quite a flush, even nauseates them at times. This is seen only very occasionally."	
9	City Hospital Indianapolis, Ind.	Yes	Yes	No	Atropine gr. 1/200 7-12 yrs. Atropine gr. 1/150 12 and up.	1	4,500 c 4,500 s		Ernest Diell, M.D. Indiana University Hospitals, Indianapolis, Ind.

10	State of Wisconsin General Hospitals. University Hospitals of Univ. of Wisc. Madison, Wisconsin.	Yes	Yes	No		2	2,000	1. Yes, we do use premedication for tonsil and adenoid cases as for all other operations, unless there are particular contra-indications. 2. We follow about the same general procedure in dosage for the various age groups as is described in an article by Beverley Leech entitled, "Preanesthetic Medication for Children" published in the Anesthesia and Analgesia Journal, Nov.-Dec., 1935.	F. A. D. Alexander, M.D. Dept. of Anesthesia, State of Wis. General Hospitals, Madison, Wis.
11	State Univ. Hospitals of Oklahoma. Oklahoma City, Okla.	Yes	Yes	No	M. S. gr. 1/12 Atropine gr. 1/300 8-10 yrs. M. S. gr. 1/8 Atropine gr. 1/250 10-12 yrs. M. S. gr. 1/8 to 1/6 Atropine 1/200 12 yrs. up	1	1,500	"We use Atropine mostly in children to dry secretions and it helps to allay apprehension. Believe premedication helps most in the anesthesia phase. Premedications are used almost routinely."	John A. Moffit, M.D. State Univ. Hospitals, Oklahoma City, Okla.
12	Kings County Hospital. New York, N. Y.	No	No	No			More than 10,000	"Not used for children. Not necessary."	M. C. Myerson, M.D. 136 East 64 Street, New York City.
13	Cook County Hospital. Chicago, Illinois.	Yes & No	Yes & No	No	Atropine gr. 1/200 ages 14-16 yrs.	1 2	4,500 c 7,500 s	"No premedications used except Atropine for large children 14 to 16 yrs. of age. Used to reduce mucus secretions."	Robt. T. Lewy, M.D. 25 E. Washington Street, Chicago, Illinois.
14	Bethesda Hospital. Saint Paul, Minn.	Yes	Yes	No	Atropine gr. 1/200	1 2	2,500	"Use Atropine hypo. gr. 1/200 in children occasionally for excessive mucus."	K. C. Wold, M.D. 1002 Loury Bldg., Saint Paul, Minn.
15	Charity Hospital. New Orleans, La.	No	No	No			7,500	"We do not use them—Premedications not indicated."	Ralph Phillips, M.D. Senior Resident N.E.T., Charity Hospital, New Orleans, La.
16	Rhole Island Hospital. Providence, R. I.	Yes	Yes	No	Atropine used in usual (amts.) on basis of grs. 1/150 for an adult	1 2	3,000	"Atropine used in our (staff) patients. Atropine and morphia used in (private) cases.	Michael J. O'Conner, M.D. 105 Waterman Street Providence, Rhode Island.
17	Fresno General Hospital. Fresno, California.	Yes	Yes	No	Graded accordingly for children	1 2	5,200	"We use Atropine Sulphate in graded amounts and it is used for all general T&A's."	H. M. Ginsburg, M.D. Director, Fresno General Hospital, Fresno, Calif.
18	Douglas County Hospital. Omaha, Nebraska.	No	No	No			5,000	"Atropine is used to decrease salivation in adults.	James W. Martin, M.D. Asst. Supt. & Medical Director, Douglas County Hospital, Omaha, Neb.
19	Duke Hospital. Durham, N. C.	Yes	Yes		Graded amts. of Atropine & Codeine for T&A's in children over 6 yrs	1	10,000	Allays apprehension. Aids most in the anesthesia phase. Use Atropine to minimize amount of secretions from ether stimulation."	Glenn Stayer, M.D. Resident N.E.T., Duke Hospital, Durham, N. C.

20	Minneapolis General Hospital, Minneapolis, Minn.	Yes	Yes		2-5 yrs. Atrop.— 1/250 gr. under 2 Atrop. gr. 1/300 5-10 yrs. Atrop. gr. 1/200 10 & up Atrop. gr. 1/150	1	3,000	"T&A's under general anesthesia receive Atropine Sulphate—we believe the Ether anesthesia is more satisfactory with the use of Atropine."	M. C. Pfunder, M.D. 645 Medical Arts Bldg., Minneapolis, Minn.
21	City Hospitals Welfare Island, New York, N. Y.	Yes	Yes	No	Atropine for children according to age. Gr. 1/300 to 1/200. Nembutal, ages 2-7 yrs. grs. 1-1/2 Nembutal, ages 7-9 yrs. grs. 2 Nembutal, ages 9-up grs. 3		10,000	"Atropine is used for prophylaxis for excessive oral secretions. With the use of Nembutal preoperatively the children come up to the operating room nearly asleep, rendering the induction much easier."	Chas. A. Seeling, M.D. City Hospital, N.Y.C., Welfare Island, N. Y.
22 23 24 25	University Hospitals, Presbyterian Hospital, Abington Memorial Hospital, Graduate Hospital Univ. Penn., Philadelphia, Pa.	Yes & No	Yes & No	No	Atropine gr. 1/250 for children between 5 & 10 yrs. Rarely used for other groups.		15,000 c & 15,000 s	"In two hospitals we use premedications and in two we do not. Some of our anesthetists feel it is easier to administer ether if the secretions are somewhat diminished following the use of Atropine."	George W. Coats, M.D. 1721 Pine Street Philadelphia, Pa.
26	Baltimore City Hospitals. Baltimore, Md.	Yes	Yes	No	Atropine according to age gr. 1/300 12 to 16 years. gr. 1/400 under 12 yrs.		6,000		W. A. Hoover, M.D. Resident Surgery, Baltimore City Hospitals, Baltimore, Md.
27	Milwaukee County Hospital. Wauwatosa, Wis.	Yes	Yes	No	Atropine gr. 1/300 3-5 yrs. Atropine gr. 1/250 5-7 yrs. Atropine gr. 1/200 7-12 yrs. Atropine gr. 1/150 12-16 yrs.	1	10,000	"Atropine is used because we believe it reduces secretions and aids the anesthesia. All our cases receive Atropine only."	Chief Resident N.E.T. Dept., Milwaukee County Hospital, Wauwatosa, Wis.
28	Henry Ford Hospital Detroit, Michigan.	No	No	No			15,000	"So far as preoperative medication for T&A's is concerned, we use none when the patient is a child. Our anesthetists feel that the Morphine and Atropine aid mostly in the anesthesia phase."	George C. Kreutz, M.D. Surgeon-in-charge, Division of Otolaryngology, Henry Ford Hospital, Detroit, Michigan.
29	Gorgas Hospital. Ancon, Canal Zone.	No	No	No	None for children under 16 yrs. of age.	1 2	300 c 1,500 s		R. H. Goldthwaite, Colonel M.C., U.S. Army Chief-of-Clinic, Gorgas Hospital, Ancon, Canal Zone.
30	Boston City Hospital. Boston, Mass.	Yes & No	Yes & No	No	Atropine gr. 1/700 1-5 yrs. Atropine gr. 1/500 5-8 yrs. Atropine gr. 1/300 8-10 yrs.	1 2	8,734 c 9,485 s in 4½ yrs.	"Premedications are used on a special pediatric group of T&A's. No premedications are used otherwise. Premedications are used to limit the mucous secretions."	Louis M. Freedman, M.D. Surgeon-in-chiefE.&T., Boston City Hosp., Boston, Mass.

hospitals in the United States are using some form of preoperative medication for tonsil and adenoid operations, and over fifty per cent of the hospitals use it routinely.

The number of cases was estimated over a three year period. It is of great interest to note that no serious complication was reported due to the use of any preoperative medication in this large series of cases—an objection which is often raised against the use of any preoperative medication.

One surgeon mentioned that the private cases were given both atropine and morphine preoperatively, while the staff or charity patients received only atropine. The economic factor is clearly pointed out and may be the reason why preoperative medication is often omitted. The fact that general hospitals are often overcrowded and hard pressed economically and short in nursing facilities, may be the reason why preoperative medication is not used more generally.

Surgeons who do use preoperative medication for their tonsil and adenoid operations all agree more or less that it definitely aids in the anesthesia and some believe it also improves the operative phase.

An interesting note was received from R. H. Goldthwaite, Colonel, M.C. U. S. Army, in which he states, "In regard to preoperative medication in tonsil operations, about seven years ago we carried out an experiment at Letterman Hospital, San Francisco, and operated fifty cases with hypo preparation only, fifty with amytal only, and fifty with both hypo and amytal. We concluded that the amytal cases did better than the hypo cases only, and that the combination was superior to either from the standpoint of ease of operation, with minimum psychic disturbance and best cooperation of the patient and with minimum postoperative complications of hemorrhage and trauma. These cases were operated by three different surgeons in the clinic who were unaware as to what preparation had been used in each case."

It has been my personal experience that with the use of preoperative medication less time is required for the anesthesia induction. Mucus secretion is definitely diminished, both during the induction and the operative phase. There is less tendency for the patient to become light, and the anesthesia is easier to maintain. How often does the surgeon have to stop and wait during a tonsil and adenoid operation to request more anesthetic or to remove excessive mucus and find fault with the anesthesia in general? Many of these most disagreeable circumstances could be avoided if the patient had received some form of preoperative medication. In no other type of operation is the team work between anesthetist and surgeon more important than in tonsil and adenoid surgery.

I have found that the patient is really under the anesthetic a shorter time during a tonsil and adenoid operation when a suitable preoperative medication has been used. A surgeon would usually not consider doing an appendectomy under a general anesthetic without the use of some preoperative medication. Why then should not the tonsil and adenoid operation—the most frequently performed operation today—receive as much concern?

The harmful effects, if any, of carefully graded amounts of the usual preoperative medications for the various age groups in tonsil and adenoid operations are more than compensated for by the many beneficial results obtained from their use.

On the basis of this study, it is

my opinion that while it is not to be denied that tonsil and adenoid operations are and can be done without the use of any preoperative medication, a much smoother and easier operation can be performed if a preoperative medication is used. I believe the use of preoperative medication for tonsil and adenoid operations is fully justified and most helpful from the standpoint of the patient, the surgeon, and the anesthetist.

REFERENCES

James T. Gwathmey, M.D., New York, *"Premedication and Inhalation Anesthesia for Tonsil and Adenoid Operations in Young Children.'* Am. J. Surg. 31:272 (Feb.) 1936.

Barlow, O. W., Fife, G. L. and Hodgins, A. C. *"Avertin in Preanesthetic Medication."* Arch. Surg. 29:810, 1934.

Robson, C. H.: *"Anesthesia in Children,"* American Journal of Surgery, 34:468, (December) 1936.

Sington, H.:*"Some Practical Points Applicable to Anesthesia in Children."* Practitioner, 130:441, 1933.

Maxson, Charles W.: *"Preoperative Preparation for Children."* Southern Medical Journal, 30:158 (February) 1937.

NEGATIVE AND POSITIVE PRESSURE IN ANESTHESIA*

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The history of the use of negative and positive pressure in anesthesia does not have an early beginning. To be specific, the word "pneumo-thorax," meaning a state marked by the presence of air or other gas in the cavity of the chest, was coined only in 1803 by a French physician named Itard. Granted that the progress gained in something over one hundred years is amazing, we are still far from the goal which we hope may be attained in this field of medical science and which, I am confident, will be reached.

The modern era of thoracic surgery dates from 1896. Quennu propagated the idea of overcoming pneumo-thorax artificially by differential air pressure. His apparatus was constructed on the principle of a diver's helmet, in which was placed the head of the patient, together with a sponge saturated with chloroform. The air in the helmet was then compressed and the pleural cavity opened under atmospheric pressure. About this time Dr. Tuffier introduced a long, narrow, curved copper tube which could be admitted into the larynx and trachea, the tissue being clamped over the tube with a forcep and the free end of the tube connected with a bellows from which air was blown into the lung.

In 1898 Drs. Matas and Parham, of New Orleans, were the first in the United states to become interested in thoracic surgery. Dr. Matas constructed an apparatus of the "Fell-O-Dwyer" type for artificial respiration. The anesthetic was given by means of

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a funnel attached to a "T" tube, with the main tube in the larynx and trachea.

A few years later, in 1904, Dr. Saverbruch, of Germany, built a chamber of five to seven hundred cubic feet content, which was seven feet, six inches high. It was constructed of iron and glass, and the operation was performed inside this chamber. The patient's head was passed through an opening in the wall of the chamber, so that he breathed at atmospheric pressure; while within the chamber, where the pleural cavity was open, the pressure was reduced.

At the same time that Dr. Saverbruch was getting his work under way, the reversed position was taken by Drs. Peterson and Engelken, who constructed positive differential pressure cabinets. Dr. Peterson's cabinet was made of wood, while Dr. Engelken's cabinet was made of iron and glass: boxes of approximately fifty cubic feet content, in which the head of the patient was placed; the air within the box was compressed so that the patient breathed at increased pressure, while the operation on the pleural cavity was performed under normal atmospheric conditions. The construction of the chambers and cabinets was such that the surgeon could not see the head of the patient, nor could the anesthetist keep in touch with the operation or observe the patient's body. The anesthetic used was chloroform, given through a fine "T" tube. In the negative chambers there were two anesthetists, who were placed at the head of the patient. In the positive cabinet, for lack of room, only one anesthetist was present and she was often almost overcome by the anesthetic. This great danger, however, was later remedied.

Brauer, of Germany, came forward with a positive pressure apparatus—an air-tight box of about five cubic feet content. In this, the head of the patient was enclosed within the cabinet in which the air was changed four or five times every minute. Openings were provided in the side of the box and the box made air-tight by means of rubber gloves fastened inside through which the hands and arms of the anesthetist were introduced, thus bringing together the surgeon and anesthetist but separating the patient and the anesthetist. Drs. Green and Janeway, of New York, later modified and improved the Brauer type as to valve action and added a mechanical appliance for artificial respiration during anesthesia.

Dr. Willy Myers, of New York, in 1908, devised one of the most complete operating chambers, which made possible the use of either positive or negative pressure, and the construction of this chamber was a long step forward. The introduction of a negative pressure chamber, large enough to contain the operating team and the patient's body, forced the use of small positive pressure cabinets, which contained only the patient's head, to be virtually abandoned.

Since 1914 perhaps no subject in connection with thoracic surgery has received more attention than that dealing with the best methods for the control of pneumo-thorax. We are fully cognizant of former methods, and equally appreciative of their value, but the new method now in use for a large percentage of thoracic operations, whereby positive pressure is given by means of large to-and-fro airways, or a tight fitting face mask, or at times by both of these methods, is a long step forward.

In thoracic surgery, when the pleural cavity is opened, the expansion of the lungs should be maintained by the administration of one of the gases under

accurately controlled pressure. At the present time there is available a choice of inhalation agents to meet the demands of any anesthetic technique or any operative procedure on any patient regardless of the patient's condition.

Contraindications for the use of nitrous oxide, ethylene, cyclopropane, or ether, with the proper premedication, are not numerous. The type and condition of the patient and the surgical manipulation anticipated will usually determine the agent that should be used to obtain the most satisfactory results. Knowledge of the effects of the various drugs is necessary in the correct selection for individual cases. Ether, for example, is irritating to the respiratory membranes, stimulates respiration, and increases secretion. Nitrous oxide is non-irritating and nontoxic, but may produce untoward results by reason of the anoxemia which usually develops unless some narcotic or other anesthetic agent is given with it. Nitrous oxide provides a pleasant, rapid induction and an immediate recovery, and the fact that it is also nonexplosive renders it a valuable agent in diathermal surgery, which is often employed in thoracic cases. Ethylene has some advantages over nitrous oxide because of the somewhat higher oxygen content of the gas mixture, but in its administration it still lacks the necessary proportion of oxygen and has the disadvantage of being explosive in the lower concentrations. Cyclopropane is given with an unusually high oxygen concentration; the relaxation obtained with cyclopropane almost approaches that of ether; it does not stimulate the respiration; it provides an induction and recovery similar to nitrous oxide, but it has the disadvantage of being as explosive as ethylene. Nevertheless, it is the consensus that this new gas will be the anesthetic of choice in thoracic surgery.

In any case, attention should be directed toward the manner of administering these gases. Ninety per cent of the difficulties that are encountered in the administration of any anesthetic by inhalation may be avoided by the insertion of an airway or an intratracheal tube. The intratracheal tube facilitates the control of the intrapulmonary pressure; the safety of the patient is increased because insufflation of oxygen is made easy; and the danger of overdistending the stomach is eliminated.

In general, the conduct of anesthesia in chest surgery is similar to that in general surgery, yet in certain respects there are important differences and serious consequences may result if the anesthetist and surgeon are not prepared to deal with them adequately. The ability, training, and experience of the anesthetist are important factors in safe and satisfactory anesthesia.

The sixth annual meeting of the National Association of Nurse Anesthetists will be held in Dallas, Texas, the week of September 26th, 1938, in conjunction with the American Hospital Association.

Further details in regard to the program and arrangements will be published in the May and August issues of the Bulletin.

THE USE AND ABUSE OF INTRATRACHEAL ANESTHESIA

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Along with the rather recent development of thoracic surgery there have been innumerable additions to the instrumentarium for intratracheal anesthesia and many refinements in its technique. The following is an attempt to clarify the indications for this valuable adjunct to anesthesia and to discuss some of the methods in use.

Indications

1. An intratracheal catheter should be used when previous experience with the patient or the history suggest the likelihood of laryngospasm occurring.
2. The preoperative passage of an intracheal catheter will often prevent a trying, emergent tracheotomy when tracheal collapse occurs; such as in the removal of large nuchal tumor masses or enlarged thyroids with tracheal displacement and compression.
3. In patients with notable sputum volume, an intratracheal catheter should be used so that frequent aspirations can be carried out. And, as Coryllos has stated, hemo-respiratory complications are thereby avoided; complications which follow bronchial plugging and shallow respiration, that is, patchy atelectasis, anoxemia, shock and bronchiogenic spread of the disease.
4. An intratracheal catheter furnishes an excellent means of administering an anesthetic mixture under positive pressure during operations in an opened thorax. The catheter may or may not carry an inflatable balloon. The latter is necessary in case differential respiration is required. By this means it is possible to administer the anesthetic to one lung alone, and maintain complete collapse of the other.
5. Certain operations upon the head, face, mouth and throat require all the available space for the surgical team. In such cases an intratracheal catheter will permit the anesthetist to work from a distance.
6. Intratracheal anesthesia will make artificial respiration a simple matter. Therefore, it may be wise to use it in cases where respiratory failure may occur, such as in basal brain operations, also in operations upon the heart and pericardium.
7. The prevention of the aspiration of blood or infected material and organisms from the upper respiratory tract can be accomplished by the use of an intratracheal catheter, providing it is inserted cleanly; the mouth is packed off; the excess tracheal lumen occluded by a balloon just below the larynx, and the catheter attached directly to the anesthetic apparatus.

These indications are not hard and fast rules. There are times when, even in their presence, it would be of advantage to the patient to dispense with an intratracheal catheter. There is a tendency to use intratracheal anesthesia too often, even in cases when the indication is not clear. Some anesthe-

tists and surgeons have forgotten that regardless of what type of catheter is inserted through the larynx, regardless of the size of the lumen or the thickness of its walls, it is obstructive to the extent of its bulk in cross section. The glottic aperture cannot be enlarged. The following surgical axiom can be applied to anesthesia: given a group of methods the simplest is the best providing other factors are equal.

There are some drawbacks to intratracheal anesthesia. If local anesthesia is not first applied, there may be difficulty in inserting a catheter, especially by the oral route, unless a stage of deep anesthesia is reached with relaxation of the jaw muscles and partial abolition of the cough reflex. Often this degree of anesthesia is undesirable, and the duration of anesthesia is lengthened by the time necessary to insert the catheter and to make subsequent preparations which otherwise could be done before induction. On the other hand, the application of a local anesthetic always carries the hazard of individual sensitivity, but on the whole it is probably the more satisfactory method.

The insertion of a catheter through a laryngoscope is the cleanest method and few if any oral organisms are carried below the larynx. However, the insertion of a catheter through the nose and pharynx does certainly carry upper respiratory organisms into the trachea. In addition, if the catheter does not have a good natural curve, troublesome bleeding may occur following trauma to adenoids with the aspiration of infected blood. A nasal catheter can be inserted with less general anesthesia than required for the oral insertion; however, oftentimes more patience is required, especially if the cough reflex is strong and the glottis opens only spasmodically. Usually, after a little time, the patient will take a deep full inspiration and the catheter slips in easily.

An intratracheal catheter can be used as an airway under a mask, or the anesthetic mixture can be delivered directly through the catheter by means of connectors. The latter are so constructed that aspirating catheters can be guided into the trachea and secretions removed without interrupting the flow of anesthetic mixture. If a tight-fitting mask over a catheter is used, upper respiratory tract organisms cannot be prevented from gaining access to the lungs, for in spite of oral packing the chamber of the mask, the nose, the accessory sinuses, and the upper pharynx are in reality all one. Organisms in any of these spaces may be air borne through the catheter into the lungs. The oral packing does prevent the migration of many mouth organisms, particularly does it prevent the flow of secretions through the larynx into the trachea by a path along the intratracheal catheter. This affords more of a danger if the cilial action of the respiratory epithelium is abolished by local anesthesia or the presence of a catheter.

It seems that the most desirable method of endotracheal anesthesia is an oral catheter, with oral packing, and the apparatus attached directly to the catheter by means of a connector that will permit facile aspiration. For operations about the mouth a nasal catheter must be used. A further means of preventing contamination of the lower respiratory tract, also of obtaining differential respiration, and of insuring a tightly closed system is the catheter with an inflatable cuff or balloon. The best catheter is one with thin walls and therefore a large lumen, still it should be soft and flexible. Complicated obturators and lights are usually unnecessary. A soft rubber catheter in which a thin metal spring is embedded,

rendering it almost non-collapsible yet maintaining its softness and flexibility, is probably the best.

In the presence of an indication for intratracheal anesthesia we occasionally see cases in which it should not be used: patients who are poor risks, in whom it is quite evident that "the less done the better," in whom the advantages of the intratracheal method do not warrant the increased time, trauma, local anesthesia, et cetera, that accompany its use. In such cases almost all the advantages of endotracheal anesthesia can be obtained by the following: a good Trendelenburg position, light anesthesia without the abolition of the cough reflex or of the cilial action of the respiratory epithelium, preoperative postural drainage, the use of a good airway and frequent pharyngeal aspirations, and a tight fitting mask for positive pressure.

In summary, it may be said that intratracheal anesthesia probably should not be used unless one of the seven indications listed above is present. In the presence of any of these indications, especially the third, fourth and fifth, there are occasional cases when the patient's needs are best supplied by a more simple technique.

Unless absolutely necessary intratracheal catheterization should not be done in the presence of granulomatous or suppurative diseases of the pharynx, larynx or trachea.

Reference

Coryllos, Pol. N. Journal of Thoracic Surgery. II:384. April, 1933.

OXYGEN THERAPY*

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The anesthetist's greatest problem is the maintenance of proper oxygenation of the blood. Until recent years, this problem was confined entirely to anesthesia, but now the field has widened, placing additional responsibility on the anesthesia service.

Gas therapy refers simply to the employment of gases in the treatment of disease. Because of the recent inclusion of helium and carbon dioxide in inhalation therapy, the term "Gas Therapy" has been selected by many authorities instead of "Oxygen Therapy." Helium is used because of its exceptional lightness. A mixture of 79 per cent helium and 21 per cent oxygen has one-third the weight and twice the velocity or half the pressure, of air.[1]

Respiration—the exchange of oxygen and carbon dioxide and the production of energy—is a fundamental process of life. In order to maintain normal respiratory function, there must be an air mixture which contains enough oxygen to meet the demand of the tissues in order to keep the respiratory center in good order, and enough carbon dioxide to cause the center to act; a heart that is able to pump an adequate supply of blood to the lungs for oxygenation; and healthy lungs to receive a sufficient amount of air to carry on normal metabolism.

Current literature teems with the

* Read at the fifth annual meeting of the National Association of Nurse Anesthetists, held in Atlantic City, N. J., September 13-17, 1937.

controversy between one group of investigators who contend that oxygen has no specific therapeutic value in the treatment of disease, although admitting that it does seem to make the patient more comfortable in the presence of cyanosis—and others who believe it to be of distinct therapeutic value. Since we are interested only in knowing why oxygen is ordered as a medicine and how our objective can best be obtained, I shall not cite the adverse opinions.

Asphyxia occurs as the result of anoxemia, and persistent limitation of oxygen hastens the loss of orientation and voluntary coordination. The three accepted stages of asphyxia are:

1. The depressed patient who can be roused
2. The unconscious patient who cannot be roused, with circulation and respiration intact, with or without muscle spasm and reflexes
3. The unconscious, relaxed patient whose reflexes have disappeared, and whose circulation is impaired.

The conditions causing unconsciousness and death by acute or subacute asphyxiation are as follows:—[2]

A. Asphyxia neonatorum occurring because of foreign body obstruction, maternal medication, atelectasis, and in prematurity;

B. carbon monoxide poisoning, caused by the increasing elimination of oxyhemoglobin by the substitution of carbon monoxide hemoglobin;

C. submersion, in which unconsciousness occurs as a result of spasm, shock, and foreign body obstruction;

D. allergy — either obstruction by a sudden glottic edema; or as a cardiac depressant;

E. strangulation—a type of pure obstruction;

F. chemical poisoning, in which the inhaled irritating vapors produce a pulmonary edema with a resultant anoxemia;

G. acute alcoholism, which causes a depression of respiration;

H. electric shock, in which the circulation is directly affected and in which a fatal result follows ventricular fibrillation;

I. terminal poliomyelitis, where the respiratory act, in so far as it depends upon the respiratory muscles, gradually fails from motor paralysis;

J. drug poisoning, in whih the center of respiration progressively loses its irritability and anoxemia ensues;

K. traumatic injury of the chest wall where laceration or perforation of a lung has caused spontaneous lung collapse and sudden change in intra-pulmonary pressure[3]—the shock plus the sudden change in pressure being accompanied by marked cyanosis.

The more nearly normal the physiologic activities of the body are maintained, the more active will be the resistance to asphyxia and the longer will the body reserves hold out.

In pneumonia, the lung is the seat of the attack[4], which presents engorgement closely followed by consolidation, causing a decreased aeration of the blood. Fever elevates metabolism about 7 per cent for each degree, consequently there is a call for additional oxygen and an increased load is thereby placed on the cardiovascular system in supplying oxygen to support the increased metabolism. Pain provokes physical and mental excitement and fever causes restlessness, both further increasing body metabolism. Thus, with the oxyhemoglobin low and the oxygen demand high, there is an increased cardiac action to compensate for the prevailing anoxemia. Since the heart is the immediate problem, it should be saved from overwork by

placing the patient in an atmosphere of 40 to 60 per cent oxygen.

Inhalation of carbon dioxide,[5] diluted with oxygen or air, is preferred by some doctors because it stimulates deep breathing, which helps to prevent the accumulation of exudate before its consolidation. Dr. Coryllos has observed that carbon dioxide liquefies pneumonic exudate with great rapidity in vitro.[5]

In pulmonary edema,[6] the gaseous exchange in the lung is hindered by the alveolar and bronchial foam. The edema compresses the pulmonary capillaries, this being another factor in the impeded pulmonary circulation. The inhalation of oxygen relieves the cyanosis to some extent.

Pulmonary infections in the newborn start as lobar or lobular atelectasis[7], due to obstruction by mucous exudate or aspirated meconium and amniotic fluid. The prophylactic as well as the immediate treatment for pneumonia in the infant includes clearing the throat of foreign fluid and the administration of carbon dioxide and oxygen for ventilation of the lungs.

Pertussis, or whooping cough, has been treated with carbon dioxide inhalations. The cough spasm is relieved to some extent by the deep respirations.

In asthma and bronchitis the presumption is that passage of air into the alveoli is retarded by contraction of the bronchi and bronchioles,[8] while in emphysema the alveoli themselves probably impede oxygenation. Respiration of oxygen enriched air in such cases increases the arterial oxygenation.

In cardiac decompensation characterized by cyanosis and congestive heart failure,[9] the inhalation of oxygen relieves the shortness of breath and increases the general well-being of the patient.

In angina pectoris inhalations of pure carbon dioxide with an open mask,[10] or a mixture of carbon dioxide and oxygen in a closed mask has effected an improvement in the patient's color and the temperature of the lips and skin, previously rather bloodless or bluish and cold. The inhalations are not given during an attack of pain, but at regular intervals three times a day, usually before meals.

Congenital heart disease is exceptional,[8] in that intense anoxemia and cyanosis occur without cardiac failure. The decreased oxygenation of arterial hemoglobin may be attributed to incomplete oxygenation of the fraction of blood that flows through the lungs and to the shunt of the blood from right to left heart through unaerated channels. By oxygen administration it is possible to raise the arterial saturation.

In anemia (whether from hemorrhage or any other cause, such as chlorosis or leukemia) asphyxial conditions result,[11] not from a deficient supply of oxygen, but from a deficiency of hemoglobin. The inhalation of oxygen in these cases does not increase the quantity of oxygen carried by the hemoglobin, but does increase the oxygen carried in solution by the plasma.

Dr. Murphy's observations in the treatment of epilepsy showed that the administration of oxygen not only hastens relaxation, stops the convulsion, causes cyanosis to disappear earlier and shortens the drowsy period, but that the attacks are fewer in number.[12]

It has been found that intestinal oxygenation for chronic non-specific ulcerative colitis appeared to act by inhibiting the growth of toxic anaerobic spore bearers,[13] by exerting a soothing influence on the spastic bowel and by preventing the development or facilitating the discharge of intramural abscesses.

Carbon dioxide and oxygen inhalations for postlabor and postanesthetic shock, uterine inertia during labor and postpartum hemorrhage,[14] mainly due to the anesthetic or to fatigue, with a subsequent increase in lactic acid, decrease the primary acidosis, thereby reestablishing normal tone and function to the uterine muscle.

Goiter patients have been placed in an oxygen chamber with satisfactory results at the Mayo Clinic.[15]

Stimulating a deep respiratory excursion with carbon dioxide and oxygen by the use of the face mask for five minutes every half hour or hour, the first 24 hours after operation, is an excellent prophylactic treatment postoperatively.

METHODS OF ADMINISTRATION

There are various methods of administering oxygen. The nasal catheter method is a simple procedure and relatively inexpensive. The new specially designed nasal catheter is perforated by small holes for one and a half inches at its terminal, in order that the stream of oxygen may prevent the catheter from adhering to the mucous membrane. To determine how far to insert a nasal catheter the distance from the patient's nostril to the lobe of the ear is measured. A flow of 4 to 5 liters of oxygen per minute will give a concentration of 38 per cent.

The metal nasal tube inhaler has soft rubber tips that merely enter each nostril. Dr. Waters has demonstrated that with the proper use of the oropharyngeal technique a flow of four, six or eight liters per minute will produce alveolar concentrations of roughly 35, 55 and 65 per cent respectively.[17] The rebreathing face mask with bag, for infant or adult, is used in most instances for intermittent inhalations to increase the respiratory volume. The tank gauge should measure accurately the flow in liters per minute, with the oxygen passing through water, humidifying it, especially when given in dry atmospheres. Intraperitoneal and intravenous injections of oxygen have been given with much success.[11] Gas by the latter method can be administered at the rate of 600 to 1200 c.c. per hour.

An oxygen tent should meet the following requirements[18]:

1. For adults a tent should have a capacity of at least 8 cubic feet.
2. The temperature should be regulated and maintained by means of a cooling device. In most patients with a fever a temperature between 58 and 68 degrees Fahrenheit is preferred, being sure that the patient's chest is well protected with a blanket.
3. A relative humidity of 40 to 60 per cent should be maintained.
4. The tent should have a soda lime attachment for use when the carbon dioxide content exceeds 1.2 per cent.
5. There should be an outlet valve on the hood so that samples may be obtained in order to ascertain the oxygen concentration and carbon dioxide content. The oxygen concentration should not be allowed to go below 50 per cent.
6. The gauge should measure accurately the oxygen flow in liters.

Oxygen chambers should meet the specifications of an oxygen tent, in regards to the oxygen concentration, carbon dioxide content, temperature and relative humidity.

Dr. Yandell Henderson writes,[19] "For administering oxygen inhalation in all varieties of cases of asyhpxia, the H-H Inhalator, with the recent addition of a Flagg device, affords in general the best means of stimulating respiration. The Davis Inhalator also has been approved

by the Council on Physical Therapy. The Infant Resuscitators of the Ohio Chemical and Manufacturing Company and of the Foregger Company have both been found efficient. A device for artificial respiration of a quite different order is the Drinker apparatus, and one of the same type offered by Emerson. The device finds its usefulness in maintaining artificial respiration for periods of days or weeks in cases of poliomyelitis with severe respiratory impairment. It has been used successfully in cases of neonatal apnea and atelectasis, but appears to offer no considerable advantages over simple inhalation of oxygen and carbon dioxide in the easier cases of asphyxia of the new-born, or over the Flagg technic in extreme cases. In the new-born the object is not, as in poliomyelitis, to supply prolonged artificial breathing but rather to get the child to breathe for itself."

PREPARATION OF THE PATIENT

I wish to emphasize the importance of the preparation of the patient for the administration of oxygen. We are all aware of the pangs of distress and fear displayed by the patient and family at the mention of oxygen or when an inhalator or tent is wheeled into the room. It is our duty to alleviate this apprehension by preparing the patient for the therapy, explaining in simple but reassuring terms that it is being given purely as a preventative measure to protect the heart from overwork and to make the patient more comfortable by being able to breathe with less difficulty. The quieting effect of these understanding words will make the oxygen therapy much more efficacious.

The following illustrates the advantage of good equipment, the favorable results of oxygen therapy, and the value to an institution of having specially trained persons available at all times to assist in emergencies arising in the oxygen therapy department.

The patient, Mrs. C, was admitted to the obstetrical department of the hospital at 2:00 P.M., immediately following what was diagnosed as pulmonary embolism. She was approximately at term after an apparently normal period of gestation. The obstetrician, Dr. B, ordered the patient to be placed in the upright position in an oxygen tent. Marked cyanosis was present, and the respirations were labored and noisy from the large amount of mucus.

At 2:30 the next morning the patient had spontaneously delivered an extremely blue baby with a faintly pulsating cord. Morphine had not been spared because of the mother's condition and a still-born baby was anticipated. The delivery was completed in the oxygen tent. To find a pulsating cord following the large amount of morphine administered and in the presence of the extreme cyanosis seemed close to a miracle. The glottis of the baby was immediately exposed with a laryngoscope and, with a metal suction tip for that purpose, fluid was aspirated from the trachea. After removing the suction tip, with the glottis still exposed, the insufflation metal tip was inserted gently into the trachea, and a mixture of 10 per cent carbon dioxide and 90 per cent oxygen was insufflated rhythmically under very slight pressure. At the end of twenty minutes the baby's color was normal and the child was only slightly fretful. For five days following delivery the baby was given carbon dioxide 5 per cent and oxygen 95 per cent, for five minutes one half hour before feeding time. The baby did well and went home in two weeks. The following morning, because of the large amount of mucus in the trachea of the mother, a carbon dioxide oxygen mixture was given for five min-

utes every hour. The mask with an attached bag was placed tightly over the patient's face while she remained in the tent. At the end of the treatment, the patient seemed a little more exhausted but was breathing deeply. She would cough for almost ten minntes at a time, bringing up large quantities of frothy mucus.

That afternoon a visiting bronchoscopist unexpectedly brought a case to surgery. Mrs. C's case was explained to him and he advised that an attempt be made to aspirate the mucus. When the patient was placed flat in bed, she choked up with mucus, and became a midnight blue color. With the bronchoscopist in attendance the throat was cocainized, the glottis exposed and with the infant suction tip connected to the tonsil suction machine, a moderate amount of foamy mucus was aspirated. Then with the Flagg insufflator, the lung was insufflated in harmony with the normal respiration, with carbon dioxide-oxygen until the patient was a light pink color. The procedure was repeated and the patient was then placed in an upright position in the oxygen tent. The patient soon became cyanotic again, but neither the cyanosis or mucus seemed as marked.

The carbon dioxide-oxygen inhalations were continued every hour for almost a week. At the end of two weeks the tent was discontinued and after six weeks the patient went home in apparently good condition. The doctors on the case felt that the oxygen treatment deserved most of the credit for saving both mother and baby.

We, as anesthetists, are in a position to render the hospital and the patient a great service as oxygen or gas therapists. Oxygen therapy is being used more extensively, consequently there is an increasing and immediate demand for someone in the hospital who understands how to operate the various oxygen machines. Our motto is "Service," so let us accept the call "for help" from this field by assisting in the development of a well organized Oxygen Therapy department.

BIBLIOGRAPHY

1. Barach, A. L. *Gas Therapy.* Amer. Jour. Surg. P. 588, Dec., 1936.
2. Flagg, P. J. *Resuscitation.* Amer. Jour. of Surg. Vol. 34, P. 591. Dec., 1936.
3. Izumi, E. D. *Personal communication.* Queen's Hospital, Honolulu, T. H.
4. Guedel, Shiner, and Cunningham. *Anoxemia in Pneumonia.* Jour. Amer. Med. Assoc. Vol. 42, P. 1152. April, 1929.
5. Gunther and Blond. Amer. Jour. Med. Science. 4:P. 525, 1937.
6. Sollmann, *A Manual of Pharmacology.* Edition 4, P. 161.
7. Coryllos, P. M. Amer. Jour. Obst. and Gyn. Vol. 21, No. 4, P. 512, April, 1931.
8. Peters and Van Slyke. *Quantitative Clinical Chemistry,* Edition 1932, Vol. 1, P. 604.
9. Barach. A L. *The Therapeutic Use of Oxygen.* Read to Anesthetist Ass'n, Jan. 19, 1931.
10. Henderson, Yandell. Amer. Heart Jour., Vol. 6, No. 4, P. 548, April, 1931.
11. Sollmann, *A Manual of Pharmacology.* Edition 4, P. 793.
12. Murphy, Patrick, *Oxygen Therapy in. Epilepsy.* Southern Medical Journal, July, 1930.
13. Felsen, Joseph. *Non-specific Ulcerative Colitis, Terminal Ileitis and Bacillary Dysentery.* New York State Jour. of Med. Vol. 35, No. 11; June, 1935.
14. McConnell, W. T.; McCormack, R. L. *Carbon Dioxide and Oxygen in*

Obstetrics. Jour. of the Amer. Med. Assoc. Vol. 101, P. 1783, Dec. 2, 1933.
15. Haines, S. F. *Anesthesia and Analgesia.* Sept.-Oct., 1930.
16. Barach, A. L. *Oxygen Treatment.* Anesthesia and Analgesia, P. 34; March-April, 1937.
17. Waters, Ralph, *Statistical Report on Oxygen Therapy at the Wisconsin Hospital for 1935.* Anesthesia and Analgesia, P. 89, March-April, 1937.
18. *Oxygen Administration.* Jour. of the Amer. Med. Ass'n, Vol. 106, P. 2188, June 20, 1936.
19. Henderson, Yandell. *Resuscitation.* Jour. of the Amer. Med. Ass'n, Vol. 103, No. 10, P. 750, Sept. 8, 1934.

THE EFFECTS OF INCREASED ATMOSPHERIC PRESSURES

MARY VINE ALLISON

Meriden Hospital, Meriden, Conn.

With the introduction of the modern diving dress by Siebe in the latter part of the nineteenth century, the effects of high atmospheric pressures upon the human body were investigated for the first time. Paul Bert, a French physiologist, collected data on this subject as well as on the effects of low atmospheric pressures, and published his observations in the book, "La Pression Barametrique" (1878).

The diving dress consisted of a waterproof suit which covered the entire body except the hands, which extended through tight elastic cuffs, and a copper helmet with a non-return air-flow valve to which a stout flexible tubing was attached. By means of this tubing air was delivered to the diver from an air pump on the surface of the water; the air escaped through an adjustable spring valve at the side of the helmet. By means of this escape valve the diver could adjust the air pressure within his suit to equal the pressure of the water in which he was working (every 33 feet of sea water equals one atmosphere, or 15 pounds per square inch). As this simple diving dress was further perfected to allow the diver to descend to greater depths, the first signs of the deleterious effects of breathing at increased atmospheric pressures were observed. Divers frequently experienced difficulties when working at depths of 12 fathoms or more. Upon exertion they were overcome by extreme exhaustion, or lost consciousness—symptoms which pointed to excess amounts of carbon dioxide.

A committee was appointed by the British Admiralty to investigate the subject of the difficulties and dangers associated with deep sea diving (Haldane and others, 1907). Samples of air taken from the divers' helmets at 12 fathoms were found to contain only 2 to 3 per cent carbon dioxide. However, the increased atmospheric pressure at 12 fathoms increased the carbon dioxide to that of 3 x 3 per cent, or an equivalent of 9 per cent at normal atmospheric pressure. The air pumps were then improved to give better ventilation to the diver, thereby decreasing the percentage of carbon dioxide within the helmet.

One of the most serious complications resulting from deep sea diving or working in compressed air chambers is

a disease known as "diver's paralysis" or "bends," termed "compressed-air illness." To Paul Bert is due most of the credit for the investigation of this disease. It was observed that upon return to normal atmospheric pressure these men sometimes became ill, were often seized with a paralysis of one or more extremities, and in some cases died. The symptoms varied in intensity, from an itching of the skin to severe pains in the extremities or abdomen, paralysis, disappearance of the pulse, and death. Various nervous symptoms were also encountered.

Autopsies revealed numerous bubbles throughout the body, occluding blood vessels and filling the heart, thereby stopping circulation. In cases of paralysis these bubbles were found in the spinal cord, principally in the white matter—the various symptoms depending upon the location at which they occurred. This bubble was found to consist of nitrogen. Its cause was evidently the increased partial pressure at which the air was breathed. The extra oxygen disappeared at once when it reached the tissues, but the extra nitrogen was merely forced into solution, gradually saturating all the tissues. (Henry's law states that liquids take up in simple solution a mass of any gas directly proportioned to its partial pressure). Vernon found, too, that gases are six times as soluble in fat as in water. This accounts for the increased amount of bubbles liberated in the myelin nerve sheaths and the white matter of the brain and cord.

As long as the men remained at the increased atmospheric pressures no symptoms occurred. But when this pressure was reduced, either by ascending from great depths, or leaving the compressed air chamber (caisson) the nitrogen which had been in solution in the tissues suddenly escaped and formed bubbles in exactly the same manner as when the cork is removed from a bottle of carbonated water. The resulting symptoms are called "bends." The higher the pressure had been and the longer the time of exposure the more serious the disease. In one of the worst cases, the diver felt faint a few minutes after his return to the surface, soon became unconscious, then pulseless, and in a short time was dead.

The men working in compressed air soon found that upon return to high pressures their symptoms disappeared at once, no matter how severe. Sir Ernest Moir introduced the medical recompression chamber in connection with the construction of the East River Tunnel in New York (about 1890) and the use of this apparatus is now required by law wherever there are extensive diving operations or engineering projects where men work at 1.5 atmospheres and over.

Considerable trouble arose in the decompression process—either in the original return to normal atmospheric pressure, or subsequent medical decompression. Following studies made by Boycott, Damont, Haldane and others, a table was compiled indicating the rate at which a diver could safely ascend, at what depths he was to stop and the number of minutes for those decompression periods. The greater the depth and the longer the exposure to increased pressures, the longer the time for decompression. A diver who has been at a depth of 200 feet for one hour or more makes eight stops in his ascent, taking a total time of nearly four hours.

The problem of divers and workers in caissons having been solved, a new situation arose with the introduction of the submarine escape apparatus. The "Momsen Lung" now used in the United States Navy consists of a flexible

rubber breathing bag which is strapped to the chest, attached to a canister of soda lime, and a labyrinth controlled by flutter valves leading to the mouth piece. The flutter valves provide for complete circulation of the oxygen within the bag, the exhalations passing through the soda lime before returning to the breathing bag proper. There is a strong clip for the nostrils to prevent the escape of air through the nose; and each man is provided with water-tight goggles.

When an escape is to be made a few men at a time gather in a small chamber, where the pressure is then increased to equal the water pressure on the outside. The "lung" is secured to the chest by straps, and the goggles are adjusted (to aid the vision while under water). Exhaling deeply, the sailor puts in the mouth piece and places the clip on his nostrils as an assistant introduces sufficient oxygen from a supply tank to slightly distend the breathing bag. The trap door is opened and the first man escapes into the ocean, at the same time releasing a cork buoy with a rope attached, long enough to reach from the submarine to the surface of the ocean. There are knots at about 20 foot intervals; the sailor clutches the rope lightly, and his own buoyancy makes him ascend. At each knot in the rope he pauses and takes several deep breaths. Free breathing throughout the entire ascent is most essential. As the pressure of the surrounding water decreases the oxygen in the "lung" tends to escape through a spring valve in the apparatus, so that the pressure within the lung is always equal to that of the surrounding water. By free breathing the sailor also regulates the pressure within his own lungs to that of the breathing bag and the water, so that when he reaches the surface he is adjusted for breathing normal atmospheric air with no injurious effects. However, there have been fatal accidents owing to the fact that some of the men became frightened and did not pause at the prescribed levels for deep breathing, but instead ascended as quickly as possible, holding their breath. When they reached the surface the pressure within their lungs was almost the same as it had been at the bottom of the ocean, while that on the outside of their bodies was normal atmospheric pressure. In the case occuring in a practice tank, the man swam to the landing board, and then collapsed. He was quickly pulled out of the water, breathed a few times and then died. Autopsy showed numerous minute hemorrhages in the lungs, minute tears in the parietal pleura, subarachnoid hemorrhages, and definite dilation of the right ventricle.

Chillingworth and Hopkins in experiments with dogs (1920), demonstrated that "with increased pulmonary pressure the systemic arterial pressure dropped to almost zero, while the venous pressure rose greatly." These facts indicated a mechanical blockage of the vessels of the lungs. Upon release of the intrapulmonary pressure the arterial pressure rose to 156 mm. Hg. and the venous pressure dropped to normal, in one minute. It is therefore obvious that the high intrapulmonary pressures occlude the great vessels of the heart, so that no blood can enter it to be pumped onwards.

Ewald and Kobert (1883) showed that an increase of 35 mm. Hg. pressure was enough to distend lungs that had been removed from the body, and they demonstrated the escape of air through the alveolar walls. Katz in 1909 showed that a pressure of 40 mm. Hg. produced the same effect in the living animal, and air escaped into the abdominal cavity. As a result of these experi-

ments it was determined that pressures exceeding 40 m.m. Hg. will cause a stretching and tearing of the alveoli, allowing air to escape into the blood vessels; then when the pressure is released air emboli fill the heart with foam, stopping the circulation, causing death from anoxemia and asphyxia.

The writer acknowledges with appreciation the help received from the United States Navy Submarine Base, New London, Connecticut, in the preparation of this paper.

BIBLIOGRAPHY

P. Bailey: *"Traumatic Hemorrhages into Spinal Cord."* Medical Research 57:573.

Thomas Oliver: *"Diseases of Occupation."*

Oppenheim: *"Text Book of Nervous Diseases."*

Wade Wright: *"Text Book of Medicine* (Cecil)."

Haldane: *"Respiration."*

CHLOROFORM*

LAURA D. BRYANT, R.N.

Cooper Hospital, Camden, N. J.

Chloroform was first used in 1847 by Dr. James Simpson and since its discovery it has been the favorite anesthetic in Continental Europe. Ether however has found greater favor in this country, more particularly in the large cities.

With chloroform the stage of induction is usually free from excitement, and the stage of maintenance is quiet and characterized by tranquil breathing and complete relaxation. The stage of recovery is comparatively short and after-effects are conspicuous by their absence.

Chloroform, unlike ether, is a distinct protoplasmic poison and kills quickly in overdosage—that is, in a concentration of five per cent or more. Chloroform is most dangerous during the stage of induction, for which it is most commonly used. Its toxic effect does not become evident until some time after its administration and is therefore termed "delayed chloroform poisoning." The degenerative effect is now well recognized and closely resembles that observed in the liver and kidneys of eclamptic patients. The pathologic picture shows congestion, hemorrhage, degeneration and necrosis. Dr. Ravdin has found that chloroform anesthesia resulted in a high incidence of liver necrosis in dogs following one hour of chloroform anesthesia in a semi-closed system and the extent of the damage was approximately ten times as great when the anesthetic was volatilized with air as when oxygen was used.

Those of us who were administering anesthetics in the era when open drop ether and chloroform, together with some local anesthesia, were being used, are well aware that this method was inadequate in many instances. For an emergency operation on a patient with an acute abdomen, complicated by bronchitis or an acute cold, chloroform anesthesia was found to be safe and afforded a relaxed abdomen. As soon as the peritoneum was closed the amount

* Read at the fifth annual meeting of the National Association of Nurse Anesthetists, held in Atlantic City, N. J., September 13-17, 1937.

of chloroform was reduced and the period of returning consciousness shortened.

Since chloroform deteriorates upon exposure to light and air, it is safer to use only freshly opened bottles containing one or two ounces only. These bottles should be of dark glass. Chloroform should never be given near a naked flame, as a product known as phosgene is then formed which may have serious effects not only on the patient but also on all others present.

When chloroform is given alone the drop method only should be employed, using a wire skeleton face mask of substantial construction, having a smooth surface for contact with the patient's face and covered with several thicknesses of gauze. One of the most widely used and satisfactory drop masks is of the Yankauer pattern. The mask should never be allowed to rest on the patient's face.

The administration should be begun cautiously by placing a few drops of chloroform on the mask and holding it near the nose and lips, which have been previously generously anointed with vaseline, as chloroform blisters if it comes in contact with the skin. One should always remember that it is dangerous to soak the mask with chloroform, consequently it should be added cautiously, drop by drop, the signs of anesthesia being the guide as to increasing or decreasing the amount given. In all anesthesias, whether of long or short duration, it is a good rule to raise the mask every few minutes and allow the patient to inhale two or three breaths of air.

Chloroform deaths may occur from the following causes:

In the induction stage:

1st—Respiratory spasm. If the administration of chloroform is continued, a large amount accumulates under the mask. Following the relief of the spasm, the patient breathes deeply, thus carrying a lethal dose of chloroform to the heart, which, weakened by the previous breath-holding, suddenly and permanently dilates. This is the usual cause of death in large, alcoholic or athletic individuals.

2nd—Vagus inhibition, causing paralysis of the heart muscle, sometimes occurring in high-strung, neurotic individuals.

In the maintenance stage:

1st—Elevation of the head and shoulders. Syncope may result, which in turn may develop into definite circulatory shock and cessation of respiration.

2nd—Simple overdosage.

In the recovery stage:

Progressive acidosis secondary to an acute septicemia, or from an unrecognized diabetes.

Postoperatively:

As a result of extensive protoplasmic poisoning, chiefly of the liver and kidneys.

Chloroform deaths are not likely to occur—

1st—if chloroform is not used in acute septicemia, acidosis or eclampsia;

2nd—if the mask is taken off during a masseteric spasm;

3rd—if the corneal reflex is always retained and a lustreless pupil, dilated and fixed, is never permitted;

4th—if rhythm of respiration is maintained and the administration changed to straight ether upon the first sign of inexplicable shallowness or irregularity.

Excitement in the induction stage is much less than when ether is given alone and relaxation is more easily accomplished. Respiration is regular,

moderately deep, rate is increased, and becomes stertorous, but is more shallow and not so rapid as when ether is used alone. Eyeballs are roving as in ether; pin-point pupils are suggestive of light anesthesia, otherwise pupils are like ether pupils. Corneal reflex is active as in ether, but lid relaxation comes somewhat sooner. If spasm occurs the anesthetic should be discontinued at once and not resumed until breathing is free.

The pulse must be observed carefully. Circulatory depression, evidenced by a small pulse of poor tension accompanied by pallor of the face, is more significant than in ether anesthesia.

Regular rhythm of respiration must be maintained and is the most important sign in chloroform anesthesia, as failure of respiration invariably precedes cardiac failure.

The return to consciousness will depend upon the depth and duration of the anesthesia. Because of its toxicity chloroform frequently gives rise to serious post-operative sickness, especially if the administration is prolonged. Following light anesthesia of short duration after-effects are usually absent.

Chloroform is contraindicated except in acute pulmonary diseases, acute obstruction of the respiratory tract, Ludwig's angina or as a preliminary to ether anesthesia when nitrous oxide is not available.

I have referred to Dr. Flagg's "Art of Anesthesia" for the laboratory findings.

ACTIVITIES OF STATE ORGANIZATIONS

MARY J. ROCHE STEVENSON
President

CALIFORNIA

An invitation from the Western Hospital Association has been extended to the California Nurse Anesthetists' Association to meet with that group in San Francisco, February 28th, March 1st and 2nd, 1938, at the Fairmont Hotel.

Dr. Malcolm MacEachern, Associate Director American College of Surgeons, will be the guest speaker at the luncheon which will be held Wednesday, March 2nd. An interesting program for this meeting is being arranged and further details will be announced later.

For information write Mrs. Mary J. Roche Stevenson, President, Franklin Hospital, 1280 Grove Street, San Francisco, Calif., or Mrs. Gay Morgan, Secretary, 807 — 39th Avenue, San Francisco, Calif.

ALABAMA

The Alabama Association will hold its annual meeting in Birmingham on April 7 and 8, 1938, in conjunction with the Alabama Hospital Association.

Miss Ann Beddow, 1601 North 25th Street, Birmingham, is Chairman of the Program Committee.

For further information write Miss Clyde Foust, President, Alabama Association of Nurse Anesthetists, Colbert County Hospital, Sheffield, Ala., or Miss Fannie Bell, Secretary-Treasurer, St. Vincent's Hospital, Birmingham, Ala.

FLORIDA

The annual meeting of the Florida Association of Nurse Anesthetists was held in Tampa, November 6, 1937, at the Tampa Municipal Hospital. Mr. T. F. Alexander, Superintendent, gave the address of welcome at a dinner given the group, to which Mrs. Ida Tedford Ellis, President of the Florida Association of Nurse Anesthetists, responded.

Dr. Robert G. Nelson of Tampa talked on "The Surgeon and the Anesthetist," stressing the importance of close cooperation between the two; also the value of the proper premedication for the various anesthetics employed. Dr. Knowlton in his talk on "The History of Anesthesia" emphasized the use of cyclopropane.

IDA TEDFORD ELLIS
President

At the business meeting a report was given of the National convention held in Atlantic City. It was voted to have two meetings of the Florida Association each year, the next to be held in Orlando in April. For further information in regard to this meeting write Mrs. Ida Tedford Ellis, President, 1210 Kuhl Avenue, Orlando, Fla., or Iva Grant, Secretary-Treasurer, Jefferson Court, Orlando, Fla.

The following officers were elected for the year 1937-38:

President	Ida Tedford Ellis, 1210 Kuhl Avenue, Orlando, Fla.
First Vice-President	Nellie Davis, 1426 Ninth Ave., St. Petersburg, Fla.
Second Vice-President	Ruby Webster, Venice, Fla.
Secretary-Treasurer	Iva Grant, Jefferson Court, Orlando, Fla.

MICHIGAN ORGANIZES

EMMA HUEBNER

who drove almost 500 miles to attend the state meeting

For several years the Michigan anesthetists have looked forward to a strong state organization and it was not because of lack of enthusiasm and interest in organization work that the Michigan anesthetists have not previously organized. Many of the Michigan anesthetists have been active in the National Association, and at every National meeting Michigan has always been well represented. Several years ago the Detroit anesthetists organized a local group which became the nucleus of the Michigan Association of Nurse Anesthetists at the organization meeting held on Saturday evening, November 13, 1937, at the Hotel Statler, Detroit, Mich. Miss Esther Meil, of Henry Ford Hospital, Detroit, who has spent much time and effort toward this end, issued the call for the meeting, and Mrs. Florence Howard acted as Chairman. Sixty-five Michigan anesthetists were present, some coming as far as from the extreme boundary of the state, five hundred miles away.

Mrs. Gertrude L. Fife, Treasurer and Chairman of the Publishing Committee of the National Association of Nurse Anesthetists, was the guest speaker of the evening. The Michigan group voted unanimously to make application for affiliation with the National Association.

The following officers were elected for the year:

President	Miss Esther Meil, Henry Ford Hospital, Detroit, Mich.
First Vice-President	Mrs. Florence Howard, Woman's Hospital, Detroit, Mich.
Second Vice-President	Miss Mabel Courtney, Grace Hospital, Detroit, Mich.
Secretary-Treasurer	Miss Ione Wessinger, Henry Ford Hospital, Detroit, Mich.
Trustees:	Mrs. Besse French, Woman's Hospital, Flint, Mich.
	Miss Alice Hain, Deaconess Hospital, Detroit, Mich.
	Miss Esther Hendricks, Harper Hospital, Detroit, Mich.
	Mrs. Gertrude Myers, St. Mary's Hospital, Detroit, Mich.
	Miss Eleanor Sturgeon, [Mich. University of Michigan Hospital, Ann Arbor,

The following anesthetists signed the roster as charter members:

Allison, Clara E.
Baird, Lillian B.
Barrow, Loretta
Becker, Dora
Bilyea, Clara
Blakely, Sarah I.
Bradbury, Nelle
Costello, Josephine Rita
Courtney, Mable E.
Crosley, Alice
Deeks, Dorothy
Dudewicz, Helen
Eckhart, Carmen
Emery, Alda
Esper, Agnes
Fleming, Bridget A.
Fletcher, Mary J.
French, Bessie Mae
Galbraith, A. Maude
Greenway, Emma
Guletta, Wilhemerina S.
Hain, Alice L.
Hamilton, Muriel L.
Hendricks, Esther
Hopkins, Ida M.
Howard, Florence C.
Huebner, Emma
Huffman, Annie
Kempton, Christine
McCool, Barbara C.
MacDonald, Theresa
McKnight, Mary G.
Martin, Mary S.
Maynes, Rosella
Meil, Esther
Moir, Ethel
Moricz, Ada M.
Muse, Eddie
Myers, Gertrude
Perry, Mae A.
Quenzinger, Dorothy C.
Roadman, Bernice M.
Sister Clara Behnke
Sheehan, Elizabeth
Simco, Josephine R.
Singer, Barbara S.
Smith, Mary B.
Snider, Ada
Stefaniak, Anne
Stephens, Alice L.
Sturgeon, Kathleen
Tarevey, Monica
Thomas, Nathalie
Trecker, Helen F.
Walsh, Jean
Wessinger, Ione
Woodcock, Sarah
Zolman, Alice

MISSISSIPPI

The annual meeting of the Mississippi Association of Nurse Anesthetists will be held April 19, 1938, in Jackson, Miss. For further information write Miss Emma Easterling, President, Vicksburg Clinic, Vicksburg, Miss., or Mrs. Sam Owen, Secretary-Treasurer, George S. Hixon Memorial Hospital, Electric Mills, Miss.

EMMA EASTERLING
President

INDIANA

The Indiana Association is planning to hold its annual meeting the early part of May. Definite announcement will be made as soon as arrangements are completed. For further information write Agnes M. Lange, Executive Secretary, Indiana Association of Nurse Anesthetists, 622 Wayne Pharmacal Bldg., Fort Wayne, Ind.; or Mrs. Margaret P. Church, President, 1016 Garden Street, Fort Wayne, Ind.

The Fort Wayne group are holding regular dinner meetings throughout the year.

NEW YORK

The fifth annual meeting of the New York Anesthetists' Association will be held at the Statler Hotel, Buffalo, N. Y., May 19 and 20, in conjunction with the New York Hospital Association.

For further information write Mrs. Ida Edwards Springer, 415 Isabella Avenue, North Charleroi, Penna., or Miss Hazel Blanchard, 1910 Seventh Avenue, Troy, N. Y.

OHIO

ALICE L. BARTH
President

The fifth annual meeting of the Ohio anesthetists will be held April 5-7, 1938, at the Deshler-Wallick Hotel, Columbus, Ohio, in conjunction with the Ohio Hospital Association.

Miss Myrn Momeyer, St. Luke's Hospital, Cleveland, is Chairman of the Program Committee. The following topics will be among those discussed:

"Some Impressions on Anesthesia from the Viewpoint of an Internist"—
R. A. Ramsey, M. D., The Crotti Clinic, Columbus, Ohio.

"Cooperative Anesthesia"—
A. Earl Brant, M. D., Chief of Surgical Staff, Youngstown Hospital Association, Youngstown, Ohio.

"Anesthesia Shock"—
F. W. McNamara, M. D., Chief of Staff, St. Elizabeth Hospital, Youngstown.

Dr. A. J. Skeel of St. Luke's Hospital, Cleveland, will also speak; subject to be announced later.

For further information write Miss Alice Barth, President, Youngstown Hospital Association, N. S. Unit, Youngstown, Ohio; or Miss Ann Nightengale, Secretary-Treasurer, 1601 Mars Avenue, Lakewood, Ohio.

OKLAHOMA

The Oklahoma Association of Nurse Anesthetists will meet Wednesday, March 16, 1938, at the Kingkade Hotel, Oklahoma City, Okla.

For further information write Julia D. Loftus, Secretary, Oklahoma State Association of Nurse Anesthetists, Community Hospital, Elk City, Oklahoma.

ROSE G. DONOVAN
President

PENNSYLVANIA

The seventh annual convention of the Pennsylvania anesthetists will be held at the William Penn Hotel, Pittsburgh, Penna., on April 27th and 28th, 1938. Miss Grace Williams, Allegheny General Hospital, Pittsburgh, is Chairman of the Program Committee; serving with Miss Williams are Miss Gertrude Render, Homestead Hospital, Homestead, and Miss Gertrude S. Byers, Allegheny General Hospital.

For further information write Miss Rose G. Donovan, President, Mt. Sinai Hospital, Philadelphia, Pa.; or Mrs. Helen Young Walker, Secretary-Treasurer, 1824 Wallace St., Philadelphia, Pa.

TENNESSEE

The annual meeting of the Mid-South and Tennessee Nurse Anesthetists' Associations will be held in Memphis at the Peabody Hotel, on February 16th and 17th, 1938. For further particulars write Mrs. Jennie Houser, President, or Miss Jean O'Brien, Secretary-Treasurer, 869 Madison Avenue, Memphis, Tenn.

MRS. JENNIE HOUSER
President

TEXAS PLANS FOR THE NATIONAL MEETING

The third annual meeting of the Texas Association will be held April 21st, 22nd and 23rd, 1938, in Houston, Texas, in conjunction with the Texas Hospital Association.

The Texas group have begun enthusiastically to lay plans to welcome the members attending the annual meeting of the National Association of Nurse Anesthetists which will be held in Dallas the week of September 26, 1938, in conjunction with the American Hospital Association. The delegates to all the allied hospital groups will surely feel the wholehearted warmth of the hospitality which is an outstanding trait of the people in the great Southwest.

It is hoped that many anesthetists from the central and western sections of the country who have been unable to attend previous conventions of the National Association because of the great distance from their homes, will plan to go to Dallas this year. Many of the Northern and Eastern groups are also anxious to visit this state of romantic beginnings, magnificent distances and vigorous, progressive citizens.

For further information in regard to the annual meeting of the Texas Association write Dorothy M. Hoadley, President, Methodist Hospital, Fort Worth, Texas; or Ora Lee Mercer, Secretary-Treasurer, 207 Medical Arts Bldg., Fort Worth, Texas.

VIRGINIA

The Tidewater Association of Nurse Anesthetists held their regular monthly meeting at the Norfolk General Hospital, Norfolk, Va., on November 16, 1937, at which time Miss Katherine Ponti gave a report of the last National meeting.

The following officers were elected for the coming year:

Chairman (re-elected)—
Miss Virginia Godbey, Norfolk General Hospital, Norfolk.

Vice-Chairman—
Mrs. Eloise Ward, Norfolk General Hospital, Norfolk.

Secretary-Treasurer—
Miss Harriet Ailstock (Vice-Chairman last year), Parrish Memorial Hospital, Portsmouth.

Chairman Program Committee—
Miss Katherine Ponti, U. S. Marine Hospital, Norfolk.

MISS VIRGINIA GODBEY
President

The Tidewater group feel that the organization has been a great help to them, affording an opportunity for discussion of problems. They also feel that it has

been a means of stimulating interest in the state and national meetings, and the social hour following the meetings has created a better understanding in the group.

It is hoped that a local association of the Richmond anesthetists will be organized soon, also the group in and around Roanoke.

The third annual meeting of the Virginia Association of Nurse Anesthetists will be held at the Richmond Hotel, Richmond, March 5th, 1938, at 5:00 P.M.

For further information write Miss Virginia Godbey, President, Norfolk General Hospital, Norfolk, Va.; or Miss Vera G. Copeland, Secretary-Treasurer, St. Elizabeth Hospital, Richmond, Va. All members are urged to be present at this state meeting.

WISCONSIN

On November 8, 1937, the Wisconsin anesthetists had a very busy but profitable and pleasant day. Those who were responsible for the program of the first annual meeting which was held on that date in Milwaukee certainly anticipated the desires of the group, and arranged a program that will long be remembered by those who attended.

In the early morning cyclopropane was demonstrated at Columbia Hospital by Miss Evelyn Hurff, at which time Dr. H. Cunningham, Director of Anesthesia in that institution, discussed the to-and-fro method which was being used. Later the group visited St. Joseph's Hospital, where several interesting abdominal cases were in progress.

A luncheon was held at the Pfister Hotel, and at the afternoon session which directly followed Dr. Cunningham discussed a subject of special interest to the anesthetist—"Emesis in Anesthesia." Dr. Cunningham showed slides demonstrating why and when emesis occurs. Others appearing on the afternoon program were Dr. E. T. Thompson, Superintendent of Mt. Sinai Hospital, Milwaukee; Dr. James Sargent, President, Wisconsin Medical Association; and Dr. Samuel Rosenthal, St. Joseph's Hospital, Milwaukee.

The program was carefully arranged so as to include sufficient time for an active business session. Miss Catherine Cameron, President of the Wisconsin Association, who attended the annual convention of the National Association of Nurse Anesthetists last September in Atlantic City, gave at this meeting a detailed report of the National meeting.

The banquet, always a necessary and delightful part of every convention program, was well attended, and the relaxation afforded by the music and entertainment at this function was particularly appreciated after such a full day.

TREASURER'S REPORT

Receipts

Dues	$126.25	
Receipts from theater ticket sale	166.12	
		$292.37

Disbursements

National convention expenses	$110.00	
Printing of constitution and by-laws	6.00	
Postage and miscellaneous expense	12.40	
		$128.40
Balance in Bank		$163.97

During the year twelve new members were accepted in the Wisconsin Association.

The following officers were elected for the year 1937-38:

President	Miss Catherine Cameron, St. Joseph's Hospital, Milwaukee.	
Vice-President	Miss Mary Donovan, Milwaukee County General Hospital, Milwaukee.	
Secretary	Miss Evelyn Hurff Columbia Hospital, Milwaukee.	
Treasurer	Miss Julia C. Jahn 4315 West Lisbon Avenue, Milwaukee.	
Trustees:	Miss Leona Bridenhagen	Green Bay
	Miss Leona Higgins	Madison
	Miss Rose Laughlin	Milwaukee
	Miss Martha Magnin	Milwaukee
	Miss Olga Sauer	Milwaukee
	Miss Olga Ulbricht	Milwaukee

THE ALUMNAE ASSOCIATION, UNIVERSITY HOSPITALS

At the last meeting, which was held in Atlantic City September 15, 1937, the Treasurer was instructed by a unanimous vote to pay to the National Association the sum of Fifty Dollars as a contribution to the Trust Fund. This is the first contribution that the National Association has received for this fund.

Following the meeting held in Atlantic City Mrs. Mary A. Ware, Children's Hospital, Cincinnati, Ohio, always a loyal friend to the School, made application for life membership in the Association. Incidentally Mrs. Ware is the first graduate to become a life member and she is also a life member of the National Association of Nurse Anesthetists.

A tea was held at the University Hospitals, Cleveland, in Harvey House, on January 27, to which all the anesthetists in Cleveland were invited. On this occasion Miss Kay Sheehan of Charity Hospital, Cleveland, was presented with a pin in appreciation of her years of service to the Alumnae Association as Secretary and Treasurer.

Miss Dora Schmidt, who has been employed at the University Hospitals in the Maternity Division since she was graduated in 1932, resigned on December 15 and will be married sometime in February. After March 1 Miss Schmidt will live in Albuquerque, New Mexico.

Miss Ann Nightengale, President of the Alumnae Association and Chief Anesthetist Lutheran Hospital, Cleveland, resigned her position on January 15 to become the bride of Mr. F. A. Dickerson. Miss Nightengale is also Secretary-Treasurer of the Ohio Anesthetists' Association and will continue to be active in organization work. Miss Marjorie Sweet, who was graduated in 1936, and who has been employed at Roper Hospital, Charleston, S. C., has been appointed to the position left vacant by Miss Nightengale, and Mrs. Jewell Wells accepted the position at Roper Hospital.

IMPORTANT NOTICE

Sometime ago a notice was inserted in the Bulletin in regard to sending dues to National headquarters in the form of currency. Some of the members are continuing this practice.

The Treasurer's office wishes to emphasize the fact that it must be definitely understood that the National Association cannot be responsible for the safe receipt of dues sent in this uninsured form, and again urges that all remittances be sent by personal or bank check, or postal or American Express money order.

NOTICE

Mrs. Viola Moser Taylor, of Milwaukee, Wis., sent a postal money order from Hawaii early in 1937 in payment of dues, which was lost in the mails, and it was not until October 22nd that the refund from the postoffice was received and credited to Mrs. Taylor for 1937 dues. We regret the omission of Mrs. Taylor's name from the list of paid-up members in the August issue.

OFFICERS

1937-38

Honorary President—Agatha C. Hodgins

President—Miriam G. Shupp

First Vice-President—Hattie Vickers

Second Vice-President—Rosalie C. McDonald

Third Vice-President—C. Virginia Godbey

Treasurer—Gertrude L. Fife

Executive Secretary—Anna Willenborg

TRUSTEES

Gertrude L. Fife
Dorothy M. Hoadley
Agatha C. Hodgins
Helen Lamb
Miriam G. Shupp
Hilda R. Salomon
Theresa A. McTurk
Hattie Vickers

THE HEADQUARTERS OF THE

NATIONAL ASSOCIATION OF NURSE ANESTHETISTS

IS LOCATED AT

18 EAST DIVISION STREET,

CHICAGO, ILLINOIS

FORM OF BEQUEST OR CONTRIBUTION

In response to inquiries reaching the headquarters of the National Association of Nurse Anesthetists the following form is suggested as a proper one to follow:

"I give, devise and bequeath to the National Association of Nurse Anesthetists' Trust Fund the sum of .....dollars, or property or holdings as follows:

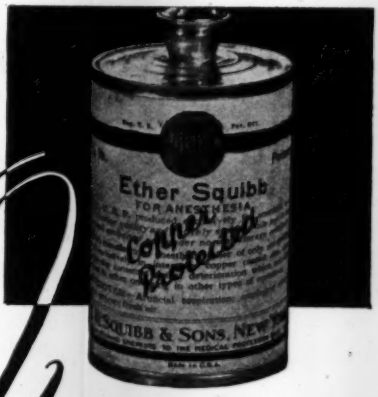
All income from the Fund known as the National Association of Nurse Anesthetists' Trust Fund will be used for the aged and indigent nurse anesthetists who qualify for participation in the benefits of said fund as stated in Trust Fund Document.

Signed.....

(Address in full).....

.....

Date..... .....



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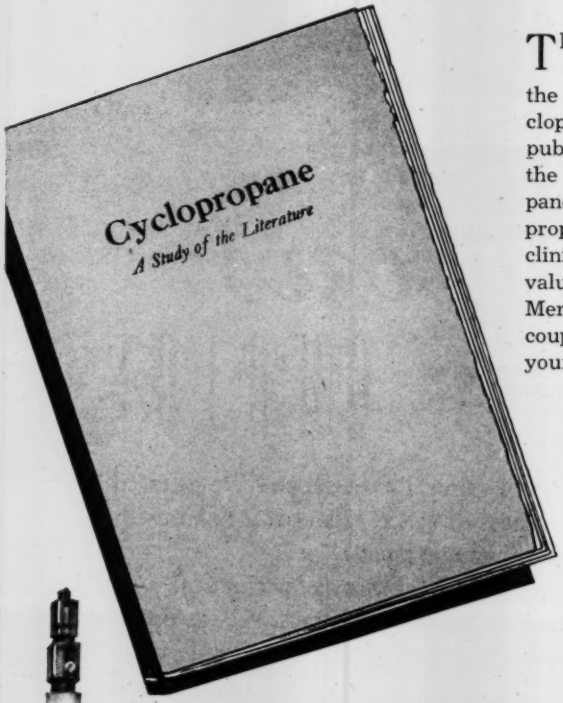

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